Product Stewardship Summary

Xylenols

Introduction:

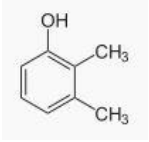
Xylenols are naturally-occurring phenolic compounds. Small amounts are present in various smoked foods, tobacco, tobacco smoke, tea, roasted coffee and essential oils from conifers. Commercial sourcing of xylenols began with coal tar distillation and, later, extraction from petroleum refinery caustics. Pure xylenol isomers (see Chemical Identity section) may be produced through synthetic and/or other separation means. However, Sasol xylenols are extracted and purified from coal gasification process streams. As a result, they are typically produced and sold as mixtures of more than one phenolic isomer.

Sasol xylenols are used predominantly by other chemical manufacturers and industrial users. They may be used as produced, or as part of more complex mixtures of related compounds, known together as cresylic acids. Xylenols are highly versatile compounds and are key raw materials in many different manufacturing processes as they possess unique reactivity and solvency properties. Although xylenols themselves are hazardous materials, they are safely used in processes and products that benefit consumers. It is often the case that xylenols are consumed entirely during use or reacted to become nonhazardous substances. The typical American uses many products which involve xylenols somewhere in their manufacture.

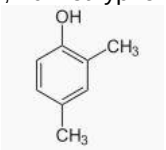
Chemical Identity:

Xylenol refers to any of the six isomers of dimethylphenol [$(CH_3)_2C_6H_3OH$] or to combinations thereof. They may also be known as hydroxy-xylene. The individual isomers are:

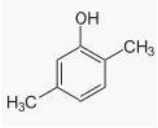
- 2,3-xylenol (2,3-dimethylphenol, CAS # 526-75-0)



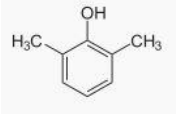
- 2,4-xylenol (2,4-dimethyphenol, CAS # 105-67-9)



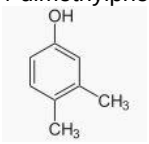
- 2,5-xylenol (2,5-dimethylphenol, CAS # 95-87-4)



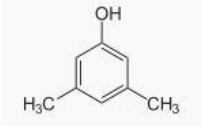
- 2,6-xylenol (2,6-dimethylphenol, CAS # 576-26-1)



- 3,4-xylenol (3,4-dimethylphenol, CAS # 95-65-8)



- 3,5-xylenol (3,5-dimethylphenol, CAS # 108-68-9)



As a group, xylenols are identified by CAS # 1300-71-6.

Uses:

Common uses for Sasol xylenols are:

- Manufacture of resins and plastics for can coatings, laminates, and construction materials.
- Production of antioxidants for jet fuel additives and sportswear.
- Manufacture of phosphate esters used as fire-resistant functional fluids in power plants.
- Reactive solvent in applying insulation to magnet wire for transformers and electrical motors of all sizes found in cars, home appliances, and power tools.
- Blending with other phenolic compounds for use in solvents, mining and oilfield chemicals, and disinfectants.

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Description and Properties:

Xylenols may be liquids or solid crystalline materials, depending on the isomer composition and the temperature. They range from colorless to yellow, amber, red or brown. Xylenols are weak organic acids which are partly miscible in water. They have a low vapor pressure but exhibit an antiseptic odor which is noticeable at concentrations below regulatory exposure limits. Xylenols are not flammable but will burn. They are stable under recommended storage conditions.

Health Information:

The primary dangers posed in handling xylenols are those resulting from physical exposure. Contacting xylenols with exposed skin or mucous membranes can cause severe irritation or burns. Xylenols also exhibit anesthetic properties. Therefore, victims may misjudge the extent of their exposure when the initial burning sensation subsides. This can result in prolonged contact, causing toxic effects in addition to the corrosive damage.

Xylenols are absorbed through the skin and mucous membranes in liquid or vapor form and may act as systemic toxins. Relatively small areas of exposure (e.g. an arm or a hand) can allow sufficient absorption to cause poisoning. Progressive symptoms of such poisoning include headache, dizziness, ringing in the ears, nausea, vomiting, muscular twitching, mental confusion, loss of consciousness and possible death from lethal paralysis of the central nervous system. In animal studies it was shown that xylenols may exhibit a skin sensitizing potential. Chronic exposure can lead to loss of appetite, vomiting, nervous disorders, headaches, dizziness, fainting and dermatitis. Xylenols are not listed as mutagens or carcinogens. There is low concern for reproductive or developmental toxic effects.

Health Effects Summary:

Effect Assessment	Result
Acute Toxicity	Toxic if swallowed. Toxic in contact with skin, No classification required for acute inhalation toxicity.
Irritation / corrosion	Corrosive. Causes severe skin burns and eye damage. Expected to be a respiratory irritant based on data on similar substances.
Sensitization	May cause an allergic skin reaction.
Toxicity after repeated exposure	Based on available data no classification is required.
Genotoxicity / mutagenicity	Not mutagenic.
Carcinogenicity	Not considered as carcinogenic.
Toxicity for reproduction	Available data do not indicate reproductive toxicity potential.

Environmental Information:

Xylenols are toxic to fish and aquatic invertebrates and care must be taken to prevent them from entering surface or ground waters. Xylenols tend to sink in fresh water but will float in concentrated brine. They are biodegradable in aerobic conditions. Soil or other materials contaminated with xylenols may become hazardous and must be disposed of by trained personnel according to regulations. In case of fire, xylenol vapors may form and be carried

with smoke downwind, creating the possibility of exposure. Xylenols have a low potential for bioaccumulation.

Environmental Effects Summary:

Effect Assessment	Result
Aquatic Toxicity	Toxic to aquatic life with long lasting effects.

Environmental Fate Summary:

Fate and Behavior	Result
Biodegradation	Inherently biodegradable.
Bioaccumulation potential	Low potential for bioaccumulation.
Mobility	Not expected to adsorb on soil. The product evaporates slowly.

Exposure Potential:

Xylenols are regulated as hazardous materials. They are used primarily by other chemical manufacturers; therefore chemical and transportation workers have the highest risk of exposure. Sasol does not sell xylenols for direct consumer use. However, downstream products containing xylenols which consumers may encounter include carburetor cleaners, degreasers, paint strippers and disinfectants. Consumers should always consult product labels for hazard and safe handling information.

Risk Management:

Xylenols can be stored, transferred, processed and disposed of safely when proper procedures and safeguards are employed in industrial use. Xylenol production is carried out in equipment designed to prevent exposure to workers and release to the environment. Tanks, piping, pumps, and other processing equipment are specified for handling of xylenols. Secondary containment around storage tanks, process air combustion, scrubbers and other means are used to further protect from release to the environment. Access to the production facility is restricted to employees, and approved contractors and visitors.

Personal protective equipment such as chemical resistant suits, gloves and boots, goggles or face shields must be worn when handling or transferring xylenols as dictated by the extent of potential exposure. Steel drums, tank trucks, railcars and other transport vessels are inspected prior to and after loading to ensure that no product is released. Carriers are approved and their performance reviewed. Sasol utilizes Chemtrec® and the National Chemical Emergency Centre (NCEC) as 24 hour contact numbers to provide emergency response information to transportation workers and first responders in the case of an accident en route.

Safety data sheets (SDS) for each product and practical safe handling information are provided to our customers and carriers so that they are able to use and transport our products safely. These documents include hazard information, chemical and physical properties, recommended storage conditions and personal protective equipment, firefighting and first aid information, accidental release measures, exposure guidelines and other regulatory information. Please refer to these documents for additional details.

Regulatory Information:

Xylenols are classified as hazardous for workers and transport. They are regulated under a variety of local, state, federal and international laws requiring exposure and environmental controls, as well as various means of hazard communication such as labeling and safety data sheets. Mixtures of xylenols have been registered under REACH (CE) 1907/2006

Classification and labelling

Under GHS, substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the safety data sheet. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use. The following classification and labelling information is based on the US Occupational Safety and Health Administration (OSHA) Hazard Communication Standard. Other regional classification and labelling information, such as substances registered for REACH in the European Union (EU), may differ from the US classification and labelling information.

Classification

Acute oral toxicity Category 3
Acute dermal toxicity Category 3
Skin corrosion/irritation Category 1B
Serious eye damage/eye irritation Category 1
Skin sensitization Category 1
Acute aquatic toxicity Category 2
Chronic aquatic toxicity Category 2

Labelling

Signal word: Danger

Hazard pictograms:

Hazard statements:

H301: Toxic if swallowed
H311: Toxic in contact with skin.
H314: Causes severe skin burns and eye damage.
H317: May cause an allergic skin reaction.
H411: Toxic to aquatic life with long lasting effects.

Precautionary statements:

P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician
P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
P260 - Do not breathe dust / fume / gas / mist / vapors / spray
P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P303 + P361 + P353 - IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water / shower
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/ physician
P273 - Avoid release to the environment.

Product Stewardship:

Sasol is committed to the safe manufacture, handling and distribution of our products. We incorporate product stewardship into our operating and business decisions. We actively communicate our product stewardship expectations to new and existing customers and distributors. Our procedures require evaluation of potential customers with regard to the suitability of the proposed use and the safe handling systems in place prior to establishing a supply relationship. We conduct audits of customers, warehouses, and carriers as appropriate. We perform an annual product risk review, including all customers and shipping locations, to identify actions we can take to further minimize risk with regard to distribution and use of cresylic acids. Progress is tracked in implementing the identified actions. Results of this review are communicated throughout the organization so that

employees are aware of the specific ways in which we meet our commitment to product stewardship and how they can support the effort.

We provide SDS and safe handling information to customers. We welcome questions and open communication with customers regarding practical handling and safety practices for our products. Our safety & health, operations, maintenance and technical service personnel are ready resources for customers and others involved in using or transporting our products.

Conclusion:

Xylenols are an important chemical feedstock for products that consumers use every day at home, in travel, and in the workplace. They have a long history of helping make our lives more comfortable, safe, productive and healthy. Although xylenols themselves are hazardous materials, they are regulated for public safety and measures are in place for their safe manufacture, storage, distribution and use.

For Further Information:

E-mail address	*usasales@sasol.com*
ICCA portal for additional information	http://www.icca-chem.org/en/Home/Global-Product-Strategy/

Glossary:

Acute toxicity	Harmful effect resulting from a single or short term exposure to a substance.
Biodegradation	Decomposition or breakdown of a substance under natural conditions (action of microorganisms etc.).
Bioaccumulation	Progressive accumulation in living organisms of a chemical substance present in the environment.
Carcinogenicity	Substance effects causing cancer.
Chronic toxicity	Harmful effect after repeated exposures or long term exposure to a substance.
Clastogenicity	Substance effect that causes breaks in chromosomes.
Embryotoxicity	Harmful effect on fetal health.
Flash point	The lowest temperature at which vapor of the substance may form an ignitable mixture with air.
Genotoxicity	Substance effect that causes damage to genes, including mutagenicity and clastogenicity.
GHS	Global Harmonized System on Classification and Labelling of chemicals.
Hazard	Inherent substance property bearing a threat to health or environment.
Mutagenicity	Substance effect that cause mutation on genes.
Persistance	Refers to the length of time a compound stays in the environment, once introduced.
REACH	REACH stands for Registration, Evaluation, Authorisation and Restriction of Chemicals. REACH is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry.

Reprotoxicity	Including teratogenicity, embryotoxicity and harmful effects on fertility.
Sensitizing	Allergenic
Sediment	Topsoil, sand and minerals washed from land into water forming in the end a layer at the bottom of rivers and sea.
Teratogenic	Substance effect on fetal morphology.
Vapor pressure	A measure of a substance's property to evaporate.
Volatile	Any substance that evaporates readily.

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References:

Ullmann's Encyclopedia of Industrial Chemistry, Release 2003, 6th edition

Safe Handling of Cresols, Xylenols & Cresylic Acids, 2015

ASTM Method D 3852-99 – Standard Practice for Sampling and Handling Phenol, Cresols and Cresylic Acid

Product Safety Data Sheet

Disclaimer:

This product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the chemical's applicable Safety Data Sheet which should be consulted before use of the chemical. The product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.

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